From the IPCC Third Assessment Report to the Fourth: The Relevance of Science

By
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At
PIER Conference, California
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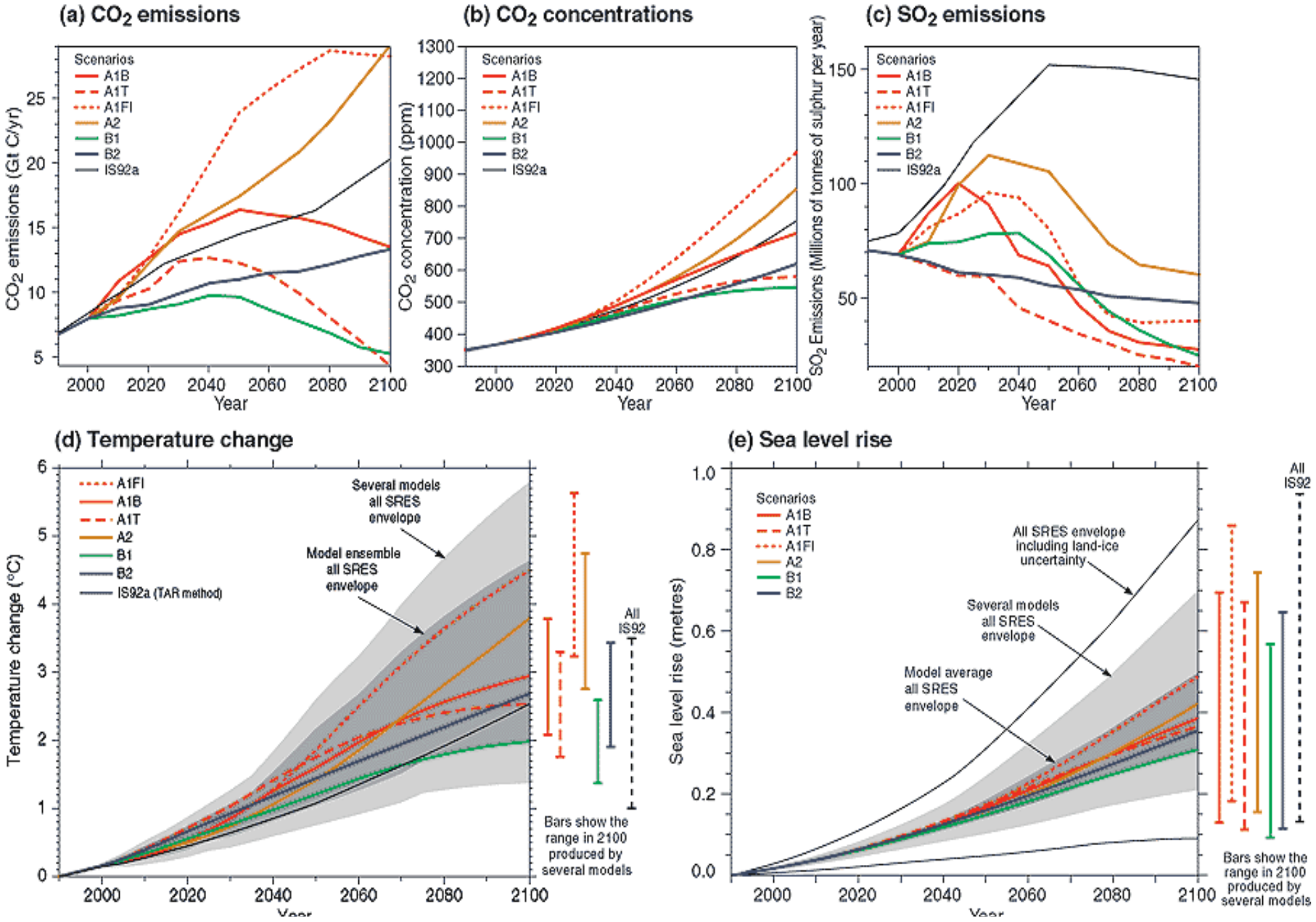
The global climate of the 21st century

Source: Climate Change 2001 Synthesis Report, IPCC



A peep into the future

On running the AOGCM (complex numerical models)

The global averaged surface temperature is projected to increase by 1.4 to 5.8 ^{o}C over the period 1990-2100

Increases in winter temperature are likely to be more, particularly in the northern latitudes

Globally averaged water vapour, evaporation and precipitation are projected to increase, although regionally the effect could vary

There are several levels of uncertainty associated with these projections

- scenario related uncertainty
- simulation uncertainty
- scientific uncertainty

Source: IPCC TAR

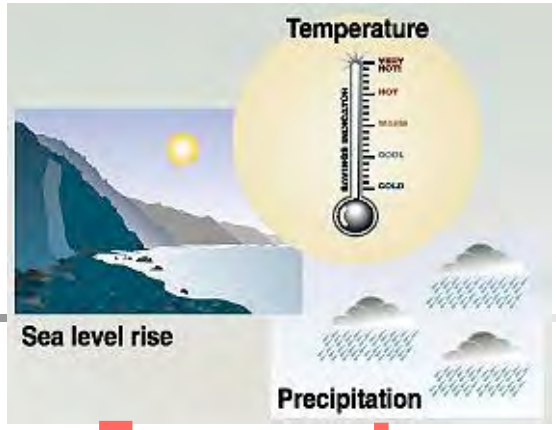
What does the science tell us?

- The earth is warming
- Precipitation patterns have changed
- There are other impacts of climate change
- Climate change has equity implications
- Climate change will affect sustainable development

Assessing vulnerability

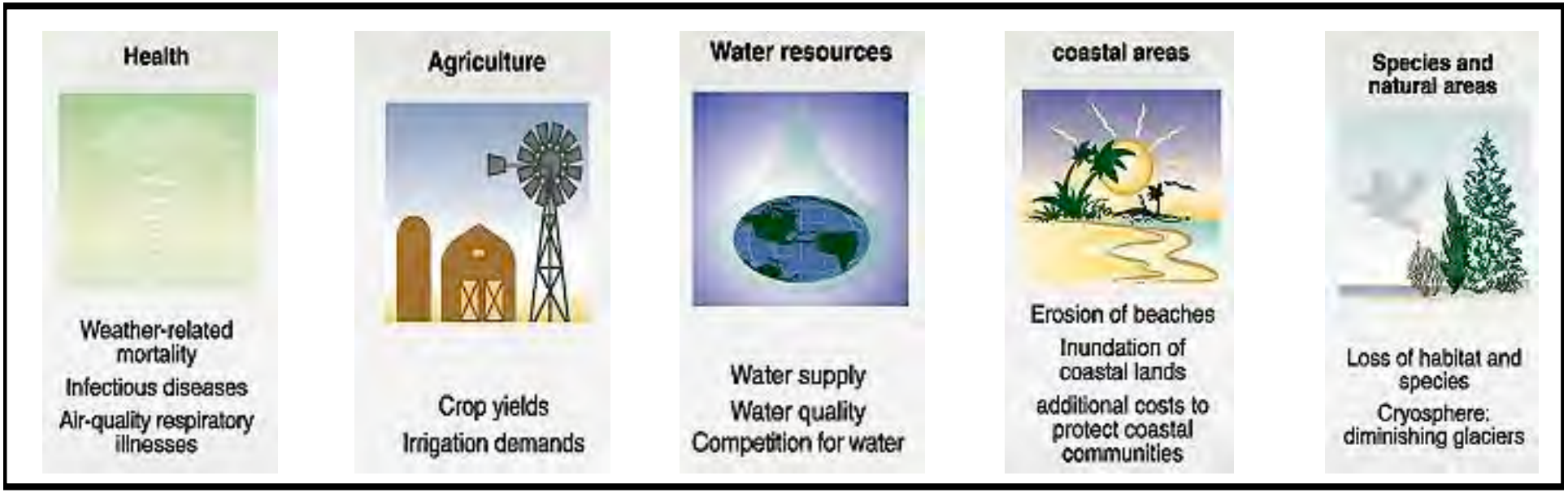
'The impacts of climate change will fall disproportionately upon developing countries and the poor persons within all countries, thereby exacerbate inequities in health status and access to adequate food, clean water and other resources'

IPCC, Third Assessment Report



Source: GRID Arendal

Impacts

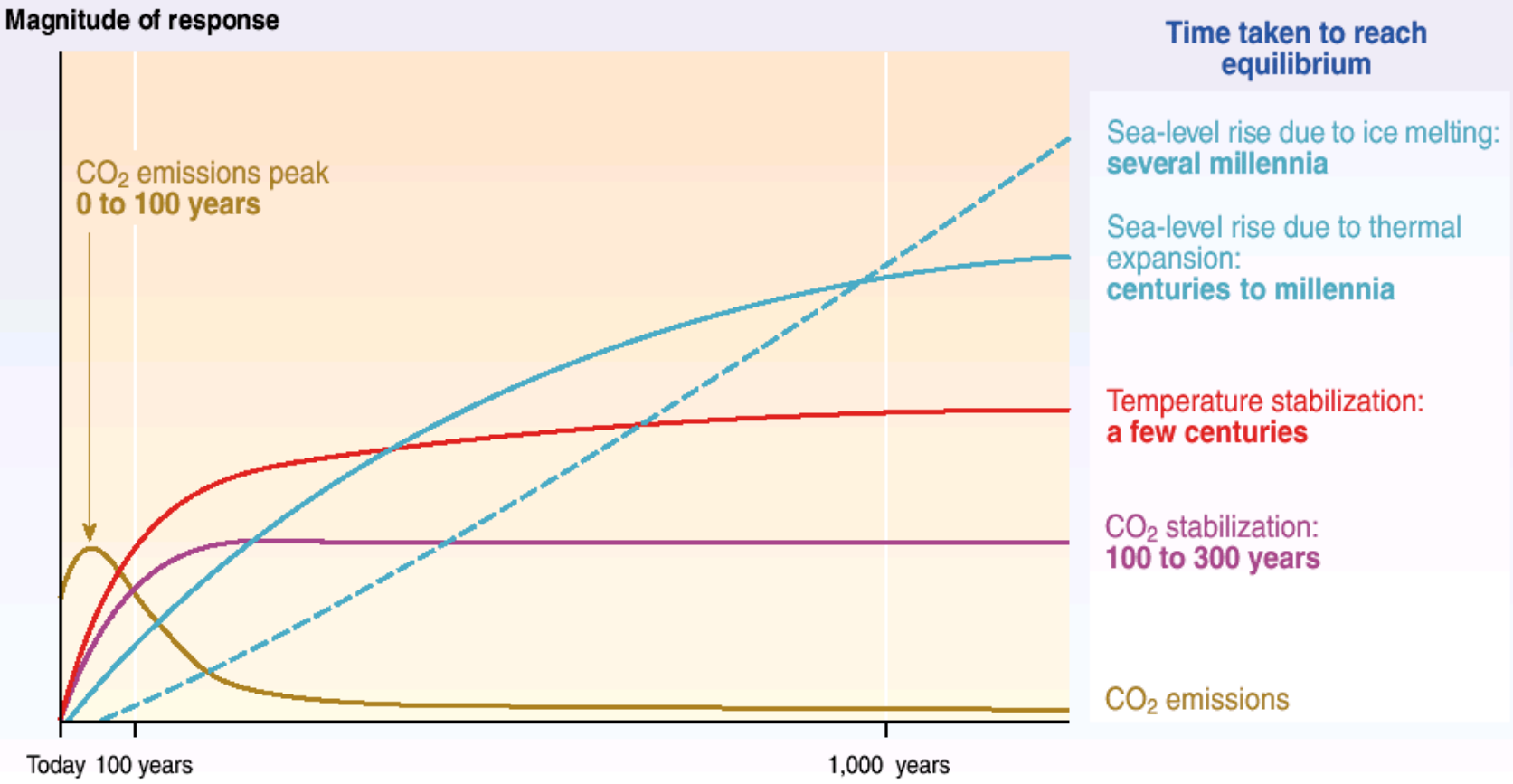


An important MDG - halve extreme poverty and hunger

- Yield deceleration of rice in Asia (Growth rates have fallen from 2.8% to 1.1 % over the 80s)
- The reasons being water scarcity, inefficient and overuse of chemical inputs, reliance on narrower genetic base
- **Impacts of climate change would exacerbate these trends**
- Considering that agriculture is the leading source of income for a vast section of the Asian population - such impacts have the potential to adversely affect the poverty levels in this region

Source: TAR WGII

CO_2 concentration, temperature, and sea level continue to rise long after emissions are reduced



Source: IPCC Syn report

Adaptation - a necessary response

- In the future, food security will be at the top of the agenda in Asian countries because of
  - growing population
  - many direct and indirect effects of climate change
- By the year 2050, about 42% of the world population would be concentrated in India and China
- Climatic variability and change will seriously endanger sustained agricultural production in Asia in coming decades

Article 2 of UNFCCC

The ultimate objective of this Convention and any related legal instruments that the Conference of the Parties may adopt is to achieve, in accordance with the relevant provisions of the Convention, stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a time-frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner

Approach to climate change: mitigation

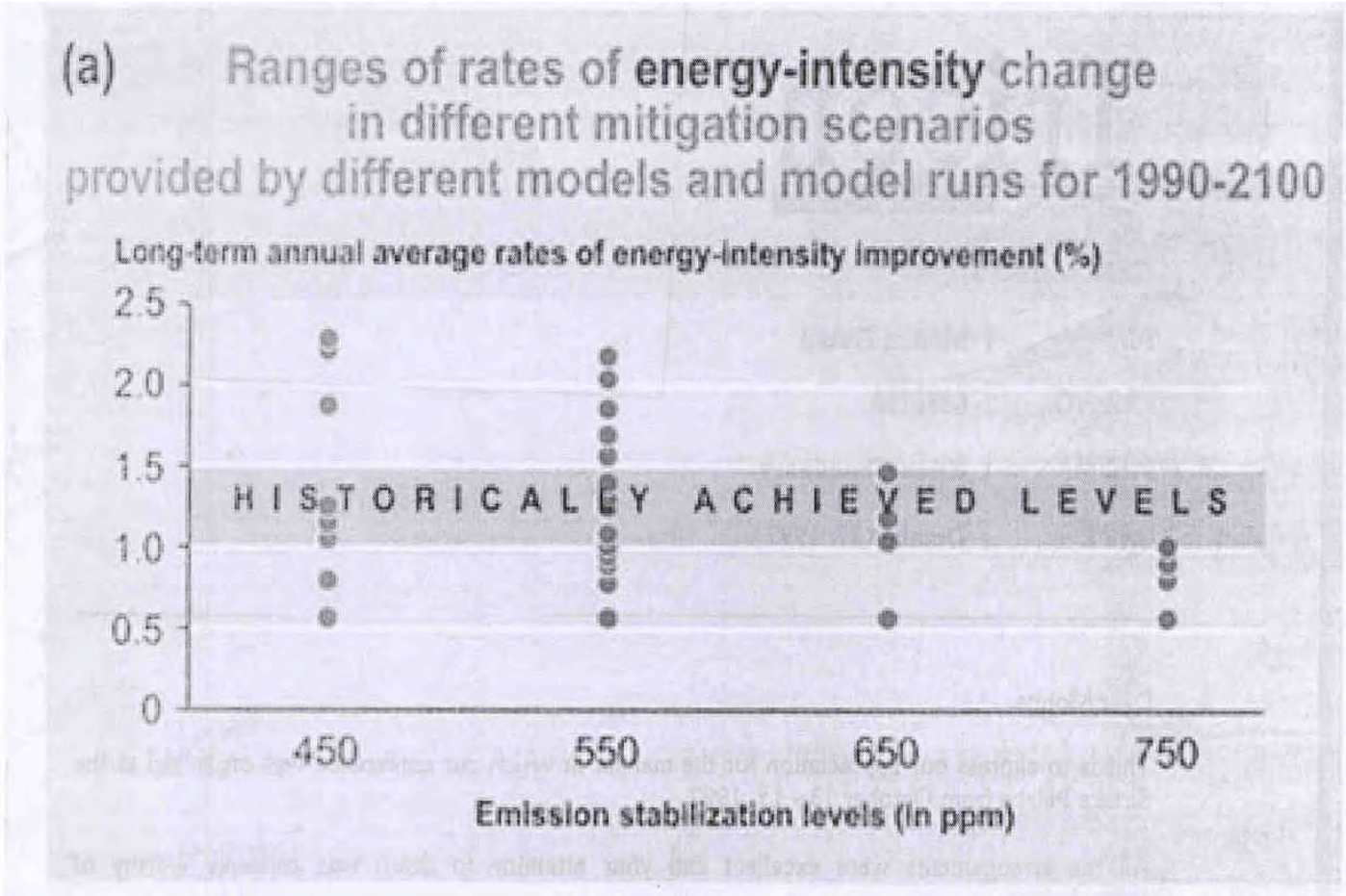
Using the Kaya Identity

CO_2 emissions = GDP * Energy Intensity * Carbon Intensity

Reduction in Energy intensity → Reduced end use demand, increased efficiency (tech change)

Reduction in net CO_2 emissions → Shift towards renewables, away from conventional fuels, C sequestration

Acceleration of energy system change



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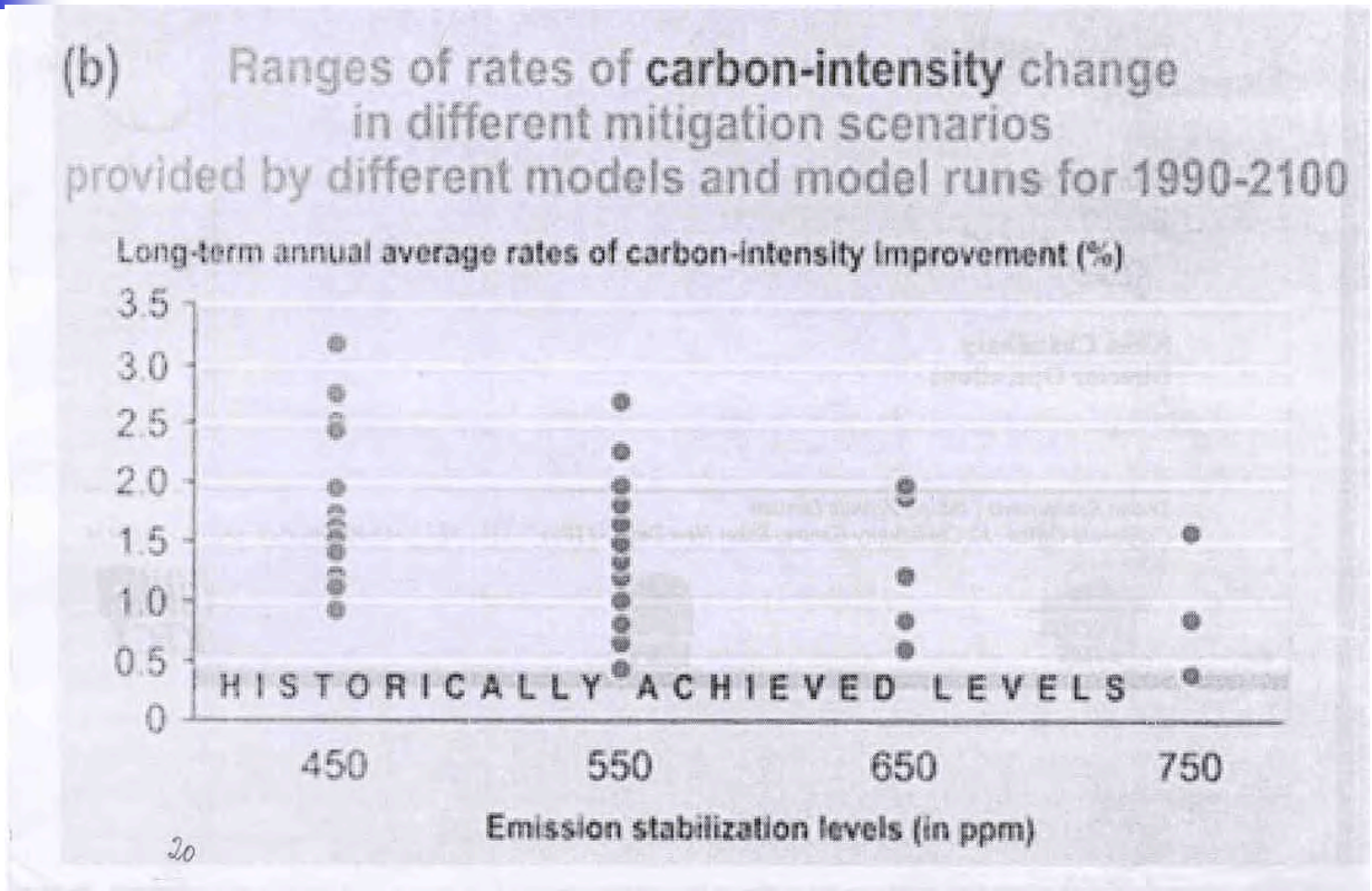
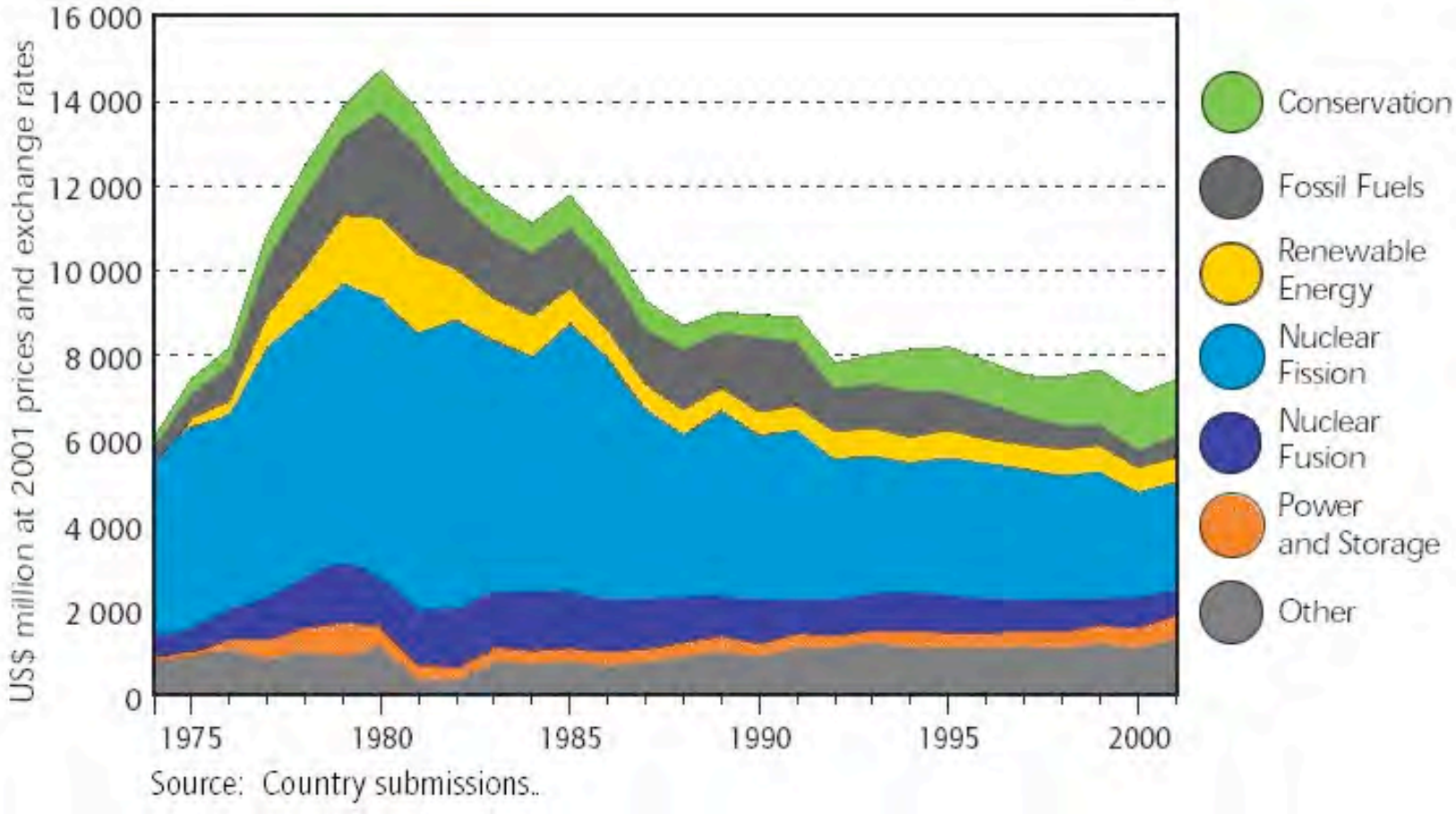


Government energy R&D budgets in IEA countries, 1974 to 2001



Source: Energy Policies of IEA Countries 2003

In support of California's leadership on climate change

- Action driven by understanding of scientific reality
- 6% of US GHG emissions
- Major impacts of climate change
- Business opportunities from pro-active measures
- Sixth largest economy in the world
- Important part of global economy
- Economic links with Asian countries
- Equity and ethical dimensions of climate change
- Common but differentiated responsibility

California trade export statistics (in $US Millions)

Partner	2002	2003	2004	2005
World Total	**92,214**	**93,994**	**109,967**	**116,818**
Mexico	16,076	14,871	17,239	17,702
Japan	11,105	11,754	13,323	13,497
Canada	10,075	11,231	12,111	13,212
China	4,482	5,465	6,841	7,850
South Korea	4,711	4,833	5,912	6,344

Source: California Chamber of Commerce Website: http://www.calchamber.com/

Implications of climate change for North America….

- Potential changes in the frequency, severity, and duration of extreme events are among the most important risks associated with climate change in North America
- In regions, where seasonal snowmelt is an important aspect of the annual hydrologic regime (e.g., California, Columbia River Basin), warmer temperatures are likely to result in a seasonal shift in runoff, with a larger proportion of total runoff occurring in winter, together with possible reductions in summer flows
- Small to moderate climate change will not imperil food and fiber production
- Climate change is expected to increase the areal extent and productivity of forests over the next 50-100 years

Source: IPCC, TAR

.... Implications of climate change for North America

- There is strong evidence that climate change can lead to the loss of specific ecosystem types
- Climate change in the polar region is expected to be among the greatest of any region on Earth. Twentieth century data for the Arctic show a warming trend of as much as 5^{o}C over extensive land areas, while precipitation has increased
- In the Antarctic, a marked warming trend is evident in the Antarctic Peninsula, with spectacular loss of ice shelves
- The Arctic is extremely vulnerable to climate change, and major physical, ecological, and economic impacts are expected to appear rapidly

Source: IPCC, TAR

Fourth Assessment Report (AR4): Cross cutting themes

- Uncertainty and risk
- Integration of Mitigation and Adaptation
- Article 2 of the UNFCCC and key vulnerabilities
- Sustainable Development
- Regional Integration
- Water
- Technology

AR4 SYR topics

1. Observed changes in climate and its effects
2. Causes of change
3. Climate change and its impacts in the near and long-term under different scenarios
4. Adaptation and mitigation options and responses, the inter-relationship with sustainable development, at global and regional levels
5. The long-term perspective: Scientific and socio-economic aspects relevant to adaptation and mitigation, consistent with the objectives and provisions of the convention, and in the context of sustainable development
6. Robust findings, key uncertainties

Background

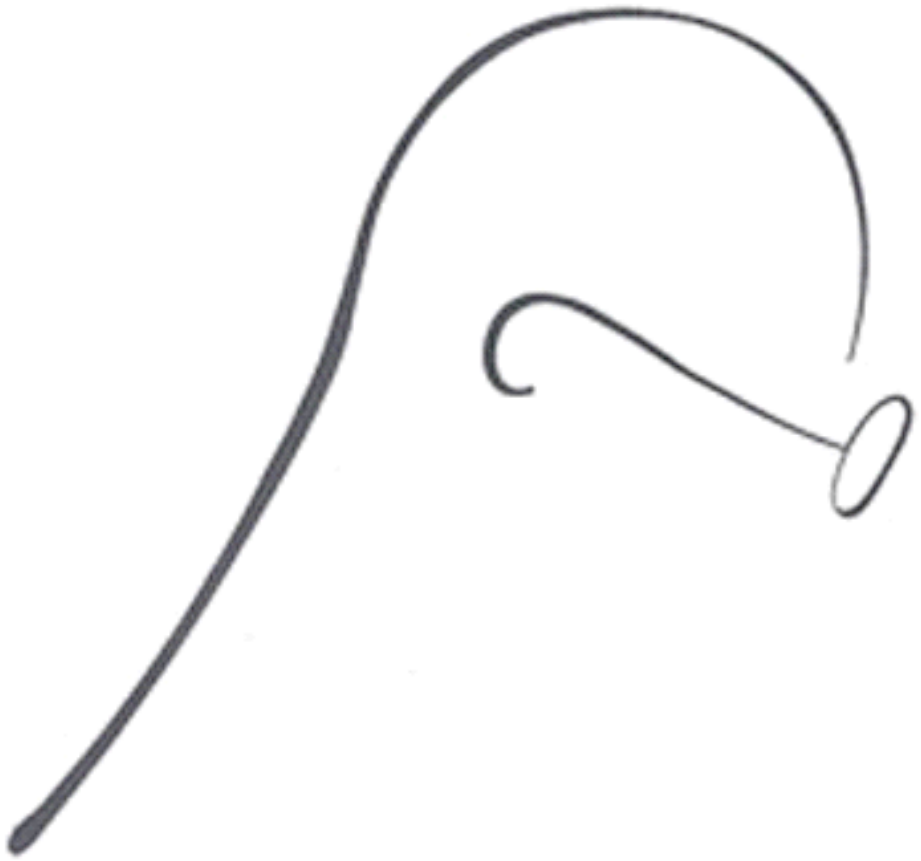
The SYR will conclude the AR4 in November 2007.
It will be one of the most widely read IPCC documents by policy makers as well as other audiences.

Context outside IPCC:

- Heightened level of public awareness on climate change
- Recent extreme weather events and public perceptions
- COP/MOP decisions and likely momentum
  - UNFCCC: Dialogue on long-term cooperative action
  - KP: Process for further commitments of Annex I Parties

"The success of our system will be an example for other states and nations to follow as the fight against climate change continues"

Governor Arnold Schwarzenegger



Be the change you want to see in the world